

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
21 July 2005 (21.07.2005)

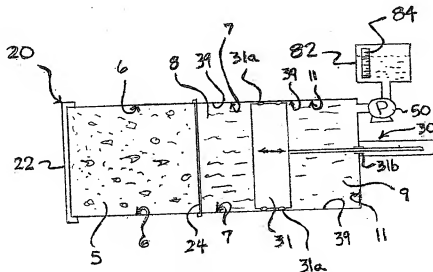
PCT

(10) International Publication Number
WO 2005/065411 A2

- (51) International Patent Classification: Not classified (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date:
29 December 2004 (29.12.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/533,824 31 December 2003 (31.12.2003) US
- (71) Applicant (for all designated States except US): SAUDI ARABIAN OIL COMPANY [SA/SA]; R-3296, Administration Building, Dhahran 31311 (SA).
- (72) Inventor; and
(75) Inventor/Applicant (for US only): JENNINGS, Scott, Steven [US/SA]; 109 Eucalyptus, Dhahran 31311 (SA).
- (74) Agent: SPATH, Thomas, E.; ABELMAN, FRAYNE & SCHWAB, 150 East 42nd Street, New York, NY 10017-5612 (US).
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— without international search report and to be republished upon receipt of that report

[Continued on next page]

(54) Title: TEST APPARATUS FOR DIRECT MEASUREMENT OF EXPANSION AND SHRINKAGE OF OIL WELL CEMENTS



(57) Abstract: A test apparatus for the measurement of expansion and/or shrinkage of a cement test sample during curing under pressure and temperature conditions that simulate downhole oil well conditions isolates the test sample from a first fixed volume of incompressible pressurized liquid using a flexible barrier that forms a wall of a first chamber in a pressure vessel assembly. The first chamber is sealed by a movable piston. A second pressurizing medium is contained in a second chamber on the opposite side of the piston, and is in fluid communication with a pump, whereby the piston is pressure-balanced between the first and the second medium. The piston moves in a bore of the vessel assembly in response to changes in the volume of the test sample during curing and the amount of linear movement of the piston is detected by a sensor system that measures, correlates and transmits any change in the position of the piston as a change in the sample volume for display and recording.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.